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Test Report

REP103751

Date of issue:
July 9, 2025

Applicant:
Leica Geosystems AG
Heinrich-Wild-Strasse CH-9435 Heerbrugg - Switzerland

Product: Laser Distance Meter for professional use

Model: Leica DISTO D2-2
Model variants: Leica DISTO D2G-2, Leica DISTO X1

FCC ID: RFF-LD7BT IC: 3177A-LD7BT

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.247
  Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz
- RSS-247, Issue 3, August 2023, Section 5
  Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz

Test location

Company name	Nemko S.p.A.
Address	Via Del Carroccio, 4
City	Biassono
Province	MB
Postal code	20853
Country	Italy
Telephone	+39 039 220 12 01
Facsimile	+39 039 220 12 21
Website	www.nemko.com
Site number	FCC: 682159; IC: 9109A

Tested by	Daniele Guarnone
Test engineer signature	
Reviewed by	Paolo Barbieri
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko S.p.A. ISO/IEC 17025 accreditation.

Copyright notification

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Leica Geosystems AG
Address	Heinrich-Wild-Strasse
City	CH-9435 Heerbrugg
Province/State	Switzerland
Postal/Zip code	9435
Country	CH

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–585 MHz
RSS-247, Issue 3, August 2023, Section 5	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902 928 MHz, 2400-2483.5 MHz and 5725-5850 MHz
RSS-Gen, Issue 5, April 2018, Amendment 1 (March 2019), Amendment 2 (February 2021)	General Requirements for Compliance of Radio Apparatus

1.3 Test methods

558074 D01 DTS Meas Guidance v05r02 (April 2, 2019)	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules
662911 D01 Multiple Transmitter Output v02r01 (October 31, 2013)	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
DA 00-705, Released March 30, 2000	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
ANSI C63.10 v2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Details of changes made to test report
REP103751	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Not applicable
§15.31(e)	Variation of power source	Pass[1]
§15.203	Antenna requirement	Pass[2]

Notes: [1] Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

[2] The Antennas are located within the enclosure of EUT and not user accessible.

2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	Pass
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Not applicable
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Pass
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	Pass
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

2.3 ISED RSS-GEN, Issue 5, test results

Part	Test description	Verdict
7.3	Receiver radiated emission limits	Not applicable[1]
7.4	Receiver conducted emission limits	Not applicable[1]
8.8	AC power line conducted emissions limits	Not applicable

Notes: [1] According to sections 5.2 and 5.3 of RSS-Gen, Issue 5 the EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.

2.4 ISED RSS-247, Issue 3, test results

Part	Test description	Verdict
5.1	Frequency Hopping Systems (FHSs)	
5.1 (a)	Bandwidth of a frequency hopping channel	Not applicable
5.1 (b)	Minimum channel spacing for frequency hopping systems	Not applicable
5.1 (c)	Frequency hopping systems operating in the 902–928 MHz band	Not applicable
5.1 (d)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.1 (e)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
5.2	Digital Transmission Systems (DTSs)	
5.2 (a)	Minimum 6 dB bandwidth	Pass
5.2 (b)	Maximum power spectral density	Pass
5.3	Hybrid Systems	
5.3 (a)	Digital modulation turned off	Not applicable
5.3 (b)	Frequency hopping turned off	Not applicable
5.4	Transmitter output power and e.i.r.p. requirements	
5.4 (a)	Frequency hopping systems operating in the 902–928 MHz band	Not applicable
5.4 (b)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.4 (c)	Frequency hopping systems operating in the 5725–5850 MHz	Not applicable
5.4 (d)	Systems employing digital modulation techniques	Pass
5.4 (e)	Point-to-point systems in 2400–2483.5 MHz and 5725–5850 MHz band	Not applicable
5.4 (f)	Transmitters which operate in the 2400–2483.5 MHz band with multiple directional beams	Not applicable
5.5	Unwanted emissions	Pass

Note: None

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 30, 2025
Nemko sample ID number	PRJ0080060005

3.2 EUT information

Product name	Laser Distance Meters
Model	Leica DISTO D2
Model variant	Leica DISTO D2G, Leica DISTO X1
Serial number	PRJ0080060005

3.3 Technical information

Applicant IC company number	--
IC UPN number	--
All used IC test site(s) Reg. number	9109A
RSS number and Issue number	RSS-247 Issue 3, August 2023
Frequency band	2400–2483.5 MHz
Frequency Min (MHz)	2402 MHz
Frequency Max (MHz)	2480 MHz
RF power Min (W),	EIRP 0.9 dBm / 0.00123 W
RF power Max (W),	EIRP 1.1 dBm / 0.00129 W
Field strength, Units @ distance	96.3 dBuV/m @ 3 m
Measured BW (kHz)	6 dB: 0.705MHz
Measured BW (kHz) (99%)	N/A
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	GFSK
Emission classification (F1D, G1D, D1D)	705KF2D
Transmitter spurious, Units @ distance	48.65 dBuV/m @ 3 m, 7439 MHz
Power supply requirements	--
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

3.4 Product description and theory of operation

The EDM distance meter, is used for measuring distances with speed and accuracy. It utilizes laser technology to determine distances between two points, making it a reliable tool for various applica-tions. The EDM specifically offers features like calculating area and volume, and includes functions for corner measurements and indirect height measurements.
The E.U.T. is equipped with the following radio interfaces:
NFC (passive tag functionality) may be used to facilitate initial pairing with a mobile device.
BLE is used for remote control and data exchange purposes with a mobile device.
For conducted measurements the EUT was equipped with a u.FL connector. Signal path from transceiver SoC nRF54L15 is routed to u.FL connector. Please refer to technical description Technical_Description_D2G_D2_X1.pdf for details

3.5 EUT exercise details

Disto Terminal and NRF connect software in order to force inTX/RX

3.6 EUT setup diagram

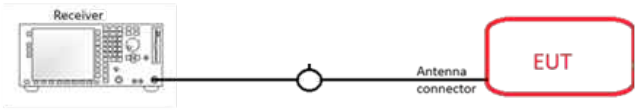


Figure 3.6-1: *Setup diagram, conducted measurements*

Figure 3.6-2: *Setup diagram, Radiated measurements*

3.7 EUT sub assemblies

Table 3.7-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
Not applicable			

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

For conducted measurements the EUT was equipped with a u.FL connector. Signal path from transceiver SoC nRF54L15 is routed to u.FL connector. Please refer to technical description Technical_Description_D2G_D2_X1.pdf for details

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	18–33 °C
Relative humidity	20–70 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Thermo-hygrometer	Testo	175-H2	20012380/305		
Thermo-hygrometer	Testo	175-H2	38203337/703		
Barometer	Castle	GPB 3300	072015		

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2, ETSI TR 100 028-1, ETSI TR 100 028-2 and other specific test standards and is documented in Nemko Spa working manuals WML1002 and WML0078.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:
P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.
F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.
Hereafter Nemko's measurement uncertainties are reported:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)

NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Semi-anechoic chamber	Nemko Spa	10m semi-anechoic chamber	530	2023-09	2025-09
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2024-09	2026-09
EMI Receiver	Rohde & Schwarz	ESW44	101620	2024-09	2025-09
EMI Receiver	Rohde & Schwarz	ESU8	100202	2024-09	2025-09
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2025-01	2026-01
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2024-08	2027-08
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2024-08	2027-08
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2024-10	2027-10
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STPL 9148-123	2024-08	2027-08
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Antenna loop	Rohde & Schwarz	HFH2-Z2	831 247/011	2024-02	2027-02
Antenna Loop Attiva+Power Inseter	Teseq	HLA6121+PI6121	45749	2023-08	2026-08
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254	2024-06	2025-06
RF Signal Generator	Rohde & Schwarz	SMB100A	180431	2025-01	2026-01
RF Signal Generator	Rohde & Schwarz	SMA100B	104075	2024-10	2025-10
Broad-Band Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9120D	01874	2024-03	2027-03
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2024-07	2025-07

Notes: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 FCC 15.247(a)(2) and RSS-247 5.2(a) Minimum 6 dB bandwidth for systems using digital modulation techniques

8.1.1 Definitions and limits

FCC and IC:

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.1.2 Test summary

Test date	June 30, 2025	Verdict	Pass
Test engineer	D. Guarnone	Sample tested	PRJ0080060005

8.1.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	100 kHz
Video bandwidth	≥3 × RBW
Frequency span	30 MHz for 20 MHz channel
Detector mode	Peak
Trace mode	Max Hold

8.1.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Semi-anechoic chamber	Nemko Spa	10m semi-anechoic chamber	530	2023-09	2025-09
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2024-09	2026-09
EMI Receiver	Rohde & Schwarz	ESW44	101620	2024-09	2025-09
EMI Receiver	Rohde & Schwarz	ESU8	100202	2024-09	2025-09
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2025-01	2026-01
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2024-08	2027-08
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2024-08	2027-08
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2024-10	2027-10
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STPL 9148-123	2024-08	2027-08
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Antenna loop	Rohde & Schwarz	HFH2-Z2	831 247/011	2024-02	2027-02
Antenna Loop Attiva+Power Inseter	Teseq	HLA6121+PI6121	45749	2023-08	2026-08
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254	2024-06	2025-06
RF Signal Generator	Rohde & Schwarz	SMB100A	180431	2025-01	2026-01
RF Signal Generator	Rohde & Schwarz	SMA100B	104075	2024-10	2025-10
Broad-Band Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9120D	01874	2024-03	2027-03
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2024-07	2025-07

Notes: NCR - no calibration required, VOU - verify on use

8.1.5 Test data

Table 8.1-1: *6 dB bandwidth results*

Modulation	Frequency, MHz	6 dB bandwidth, MHz	Limit, MHz	Margin, MHz
BLE	2402	0.689	0.50	0.189
	2440	0.649	0.50	0.149
	2480	0.705	0.50	0.205

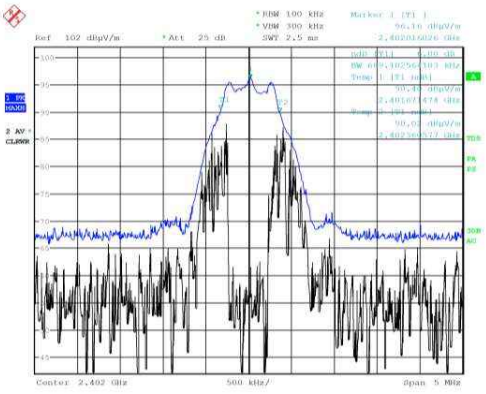


Figure 8.1-1: *6 dB bandwidth on low channel*

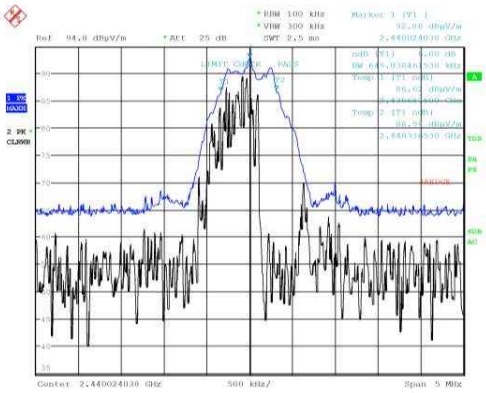


Figure 8.1-2: *6 dB bandwidth on middle channel*

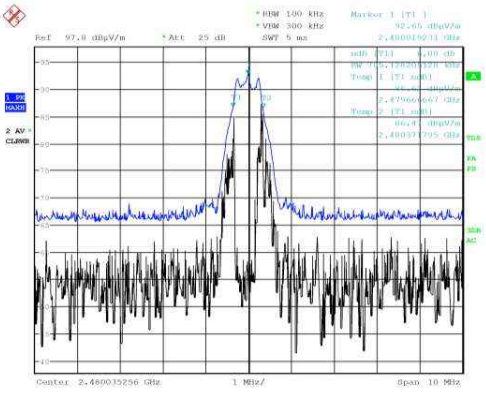


Figure 8.1-3: *6 dB bandwidth on high channel*

8.2.1 Definitions and limits

FCC:

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 W (30 dBm). As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Fixed, point-to-point operation, as used in paragraphs (b)(3)(i) and (b)(3)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

(c) Operation with directional antenna gains greater than 6 dBi.

(2) In addition to the provisions in paragraphs (b)(1), (b)(3), (b)(4) and (c)(1)(i) of this section, transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers provided the emissions comply with the following:

(i) Different information must be transmitted to each receiver.

(ii) If the transmitter employs an antenna system that emits multiple directional beams but does not do emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device, i.e., the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels, shall not exceed the limit specified in paragraph (b)(1) or (b)(3) of this section, as applicable. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as follows:

(A) The directional gain shall be calculated as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

ISED:

d. For DTSs employing digital modulation techniques operating in the bands 902–928 MHz and 2400–2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

e. Fixed point-to-point systems in the bands 2400–2483.5 MHz and 5725–5850 MHz are permitted to have an e.i.r.p. higher than 4 W provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. Point-to-multipoint systems, omnidirectional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding an e.i.r.p. of 4 W.

ISED:

f. Transmitters operating in the band 2400–2483.5 MHz, may employ antenna systems that emit multiple directional beams simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers, provided that the emissions comply with the following:

Different information must be transmitted to each receiver.

If the transmitter employs an antenna system that emits multiple directional beams, but does not emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device (i.e. the sum of the power supplied to all antennas, antenna elements, staves, etc., and summed across all carriers or frequency channels) shall not exceed the applicable output power limit specified in sections 5.4(b) and 5.4(d). However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the applicable power limit specified in sections 5.4(b) and 5.4(d). If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the applicable limit specified in sections 5.4(b) and 5.4(d). In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the applicable limit specified in sections 5.4(b) and 5.4(d) by more than 8 dB.

Transmitters that transmit a single directional beam shall operate under the provisions of sections 5.4(b), 5.4(d) and 5.4(e).

8.2.2 Test summary

Test date	June 30, 2025	Verdict	Pass
Test engineer	Select a name	Sample tested	PRJ0080060005

8.2.3 Observations, settings and special notes

Spectrum analyser settings for output power:

Resolution bandwidth	> the 6 dB bandwidth of the emission being measured
Video bandwidth	≥ RBW
Frequency span	approximately 5 times the 6 dB bandwidth
Detector mode	Peak
Trace mode	Max Hold

8.2.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Semi-anechoic chamber	Nemko Spa	10m semi-anechoic chamber	530	2023-09	2025-09
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2024-09	2026-09
EMI Receiver	Rohde & Schwarz	ESW44	101620	2024-09	2025-09
EMI Receiver	Rohde & Schwarz	ESU8	100202	2024-09	2025-09
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2025-01	2026-01
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2024-08	2027-08
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2024-08	2027-08
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2024-10	2027-10
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STPL 9148-123	2024-08	2027-08
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Antenna loop	Rohde & Schwarz	HFH2-Z2	831 247/011	2024-02	2027-02
Antenna Loop Attiva+Power Inseter	Teseq	HLA6121+PI6121	45749	2023-08	2026-08
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254	2024-06	2025-06
RF Signal Generator	Rohde & Schwarz	SMB100A	180431	2025-01	2026-01
RF Signal Generator	Rohde & Schwarz	SMA100B	104075	2024-10	2025-10

Broad-Band Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9120D	01874	2024-03	2027-03
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2025-01	2026-01
Preamplifier	Schwarzbeck Mess-Elektronik	BBV9718	BBV9718-137	2024-06	2025-06
RF Power Sensor	Rohde & Schwarz	NRP18AN	100990	2025-03	2026-03
RF Power Sensor	Rohde & Schwarz	NRP18AN	100987	2024-11	2025-11
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2024-07	2025-07

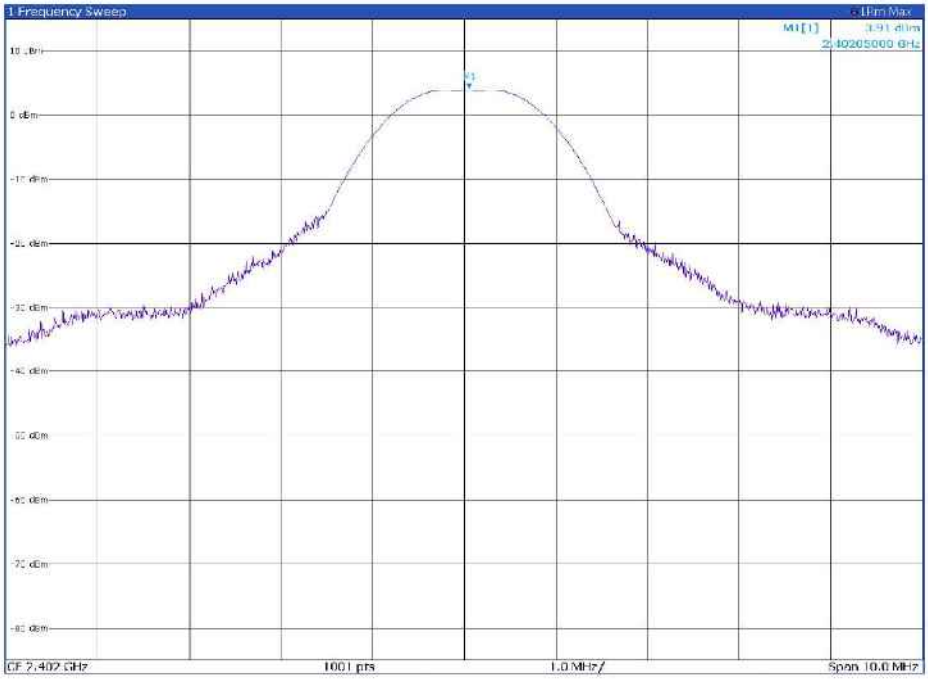
Notes: NCR - no calibration required, VOU - verify on use

8.2.5 Test data

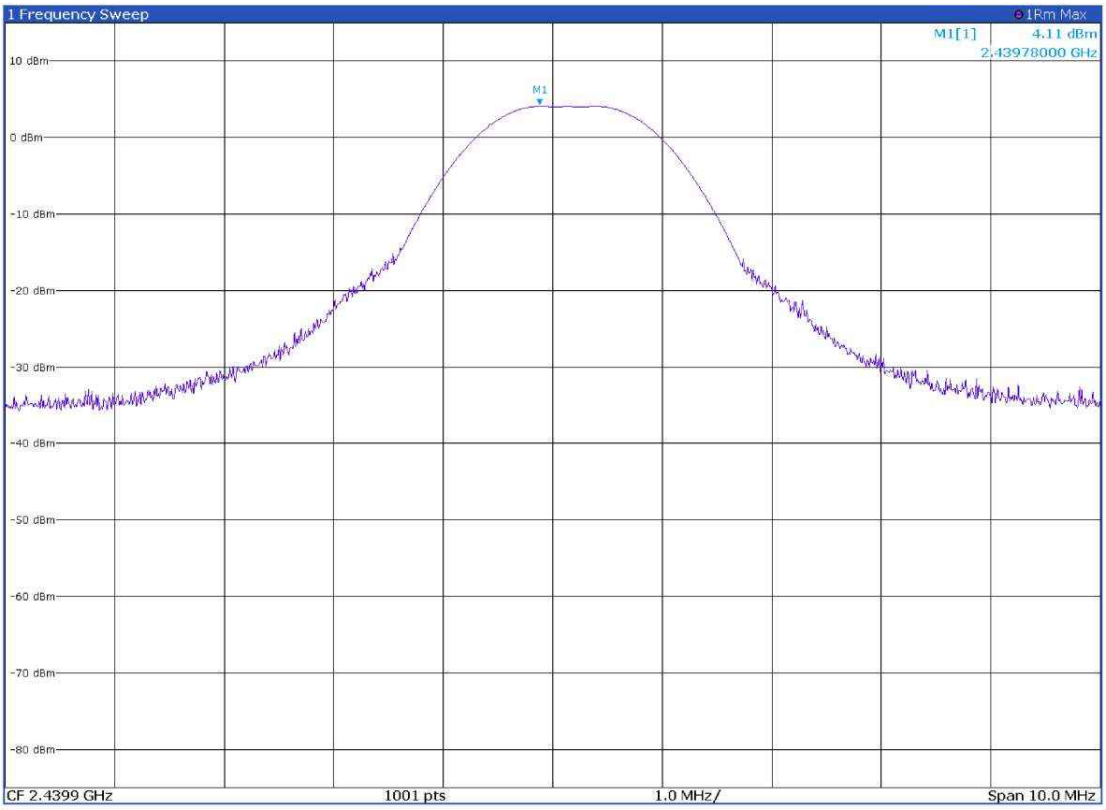
Table 8.2-1: *Output power measurements results*

Modulation	Frequency, MHz	Conducted output power, dBm		Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB
		Power	Limit					
BLE	2402	3.9	30.00	-26.1	-3	0.9	36.00	-35.1
	2440	4.1	30.00	-25.9	-3	1.1	36.00	-34.9
	2480	3.9	30.00	-26.1	-3	0.9	36.00	-35.1

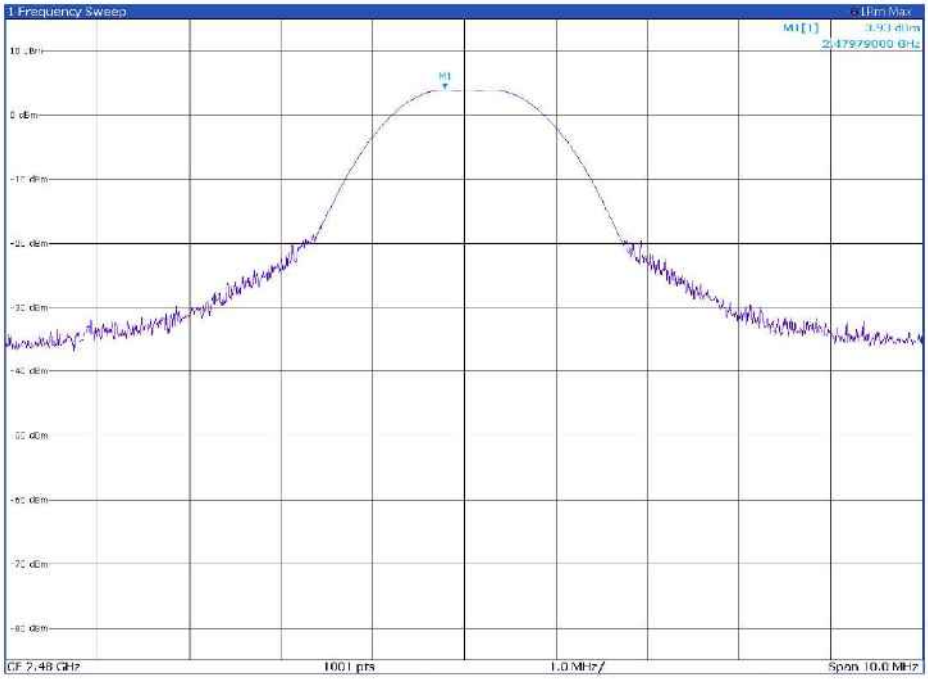
Note: Max EIRP (dBm) = Peak Power (dBm) + Antenna Gain (dBi)



Conducted antenna power for low channel



Conducted antenna power for middle channel



Conducted antenna power for high channel